REMARKS

Claims 1-37 are pending in this application. Claim 1-37 have been rejected in the outstanding Official Action.

Claims 1 and 30 have been amended, Claims 38-41 have been added, and Claim 37 has been canceled.

The claims have been amended for the sole reason of advancing prosecution. The amendments to Claims 1 and 30 are supported, inter alia, at page 1, lines 15-20, Figs. 1A, 1B, and 1C; at page 8, lines 22-23, by deleted claim 37; and page 10, lines 1-3, Fig. 9. Applicants, by amending any claims, make no admission as to the validity of any rejection made by the Examiner against any of these claims. Applicants reserve the right to reassert the original claim scope of any claim, in a continuing application. The subject matter of newly presented claims 38-41 is supported throughout the specification, claims and figures as originally filed.

Support for the claims as amended appears throughout the specification, claims and figures as originally filed. Applicants respectfully submit that the amendments do not introduce any new matter within the meaning of 35 U.S.C. §132.

In view of the following, further and favorable consideration is respectfully requested.

I. Claims 1-36 stand rejected under 35 U.S.C. 112, second paragraph at Paragraph 3 on page 2 of the Official Action. The rejection is respectfully traversed.

Claim 1 has been amended as follows:

> *A self-propelled Mini or Micro UAV configured for* ***aerodynamic flight*** *at* ***flight speeds in the range between about 10m/s to about 20 m/s at*** *Reynolds numbers in the range between about 20,000 and about 300,000, and comprising a fore wing and an aft wing in tandem close-coupled arrangement, wherein said aft wing has side panels and control surfaces on at least one of said aft wing and said side panels, and tapered planform with positive sweep, said fore wing has non-positive trailing edge sweep, the fore wing and aft wing being disposed at different heights, and said arrangement being free of additional wings or tail arrangement,* ***wherein said Reynolds numbers are based on a characteristic chord length of a main wing of said UAV, said main wing being one of said fore wing and said aft wing****.*

It is respectfully submitted that these amendments overcome the 35 U.S.C. §112, second paragraph rejection based on indefiniteness.

For example, independent claims 1 and 30, and the claims depending thereon, positively recite the flight speed range and the corresponding Reynolds number range that are to be met by the Mini or Micro UAV in *aerodynamic flight* thereof.

Moreover, the Reynolds numbers are based on a characteristic chord of a main wing of the UAV, which is the standard definition as known in the art for the Reynolds number of an aircraft, the "main wing" being one of the fore wing or the aft wing in claim 1. In fact, the Examiner acknowledges that "*[t]ypically a chord length of the main wing is used*". However, the Examiner goes on to say that "*however two wings are providing lift in the claimed invention*" – in this connection, it is respectfully submitted that in aircraft configurations including a canard, the canard *also* typically produces lift, and in aircraft configurations including tail planes, these *also* produce (negative) lift. Thus, it is quite clear that the default definition of the Reynolds number being defined based on the characteristic

chord of the main wing, where commonly the aircraft have two sets of wings – the main wings and another set of lift-producing wings (fore or aft), clearly applies also to the UAV configuration. One skilled in the art at the time of the invention would therefore apply the same definition to the UAV of the present invention.

It is submitted that the definition of Reynolds number in claims 1 and 30, and the claims depending thereon, is a clarification of terms in the manner commonly understood in the art, and does not constituted new matter.

Regarding the Examiner's comment as to which "*structure is being required by the Reynolds number requirement*", it is respectfully submitted that the Mini or Micro UAV itself is "*configured for aerodynamic flight*" at the aforesaid speed range and at the Reynolds number range, and thus must be capable of aerodynamic flight at these conditions. These "operating conditions" for aerodynamic flight present structural limitations to the UAV.

Furthermore, the ranges of speed (V) and Reynolds number (Re) together provide a corresponding range of kinematic viscosity (υ) in which the UAV is configured to operate, since:

$$Re = V \times c / \upsilon$$

...and, since "c" is also known, being the characteristic chord length, which is also defined in claims 1 and 30, and the claims depending thereon.

Claim 37 has been canceled above, thus obviating a response to the rejection of Claim 37.

II. Claims 1-4, 6-20, 36, and 37 stand rejected under 35 USC § 103(a) as being unpatentable over Delanne (U.S. Patent No. 2,147,968) in view of Cox et al. (U.S. Patent Application Publication No. 2003/0155463) beginning at Paragraph 8 on page 3 of the Official Action. This rejection is respectfully traversed.

To establish a *prima facie* case of obviousness, the Examiner must establish: (1) some suggestion or motivation to modify the references exists; (2) a reasonable expectation of success; and (3) the prior art references teach or suggest all of the claim limitations. *Amgen, Inc. v. Chagai Pharm. Co.,* 18 USPQ2d1016, 1023 (Fed. Cir. 1991); *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 USPQ 494, 496 (CCPA 1970).

A *prima facie* case of obviousness must also include a showing of the reasons why it would be obvious to modify the references to produce the present invention. *See Dystar Textilfarben GMBH v, C. H. Patrick*, 464 F.3d 1356 (Fed. Cir. 2006). The Examiner bears the initial burden to provide some convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings. *Id.* at 1366.

Delanne disclose a full size manned aircraft. Specifically, Delanne mentions the presence of a gunner, See page 2, left column, line 11; the whole of the fuselage being rendered habitable from the front to the rear end, See page 2, left column, lines 24-25; and a commercial twin-engine hydroplane, See page 2, right column, lines 73-73. Delanne does not describe dimensions or Reynolds numbers of flight operation. The manned aircraft disclosed by Delanne factually is not a Mini or Micro UAV as defined by the Defense Advanced Research Project Agency (DARPA) and disclosed in the original specification at page 1, lines14-17 (PCT WO 2005/030578 A1). Again, "Mini-UAV are vehicles of about

20 cm to 1.2 m while Micro-UAV are limited to 6 inches (15 cm) in either dimension."

The Examiner contends that "Delanne discloses an aircraft configured for operating at Reynolds numbers in the range between about 20,000 and about 300,000 (at least during slow taxing on a runway) and configured for operating at least at flight speeds in the range between about 10 m/s to about 20 m/s (all of the components of the aircraft are operable at all speeds; for example the control surfaces and engine operate no matter what speed the craft is traveling)."

It is pointed out that the claims now recite "aerodynamic flight", thus, taxing on a runway is not part of aerodynamic flight operations. Further, the full size manned aircraft of Delanne will not sustain aerodynamic flight in the claimed range of Reynolds number and air speed.

Cox et al. describes an unmanned powered aircraft. Cox et al. does not disclose the unmanned powered aircraft being a Mini or Micro UAV. Further, Cox et al. does not disclose the flight speed, Reynolds numbers for aerodynamic flight, physical dimensions of the unmanned powered aircraft, and other parameters to define the powered aircraft being a Mini or Micro UAV according to the claimed combination. Cox et al. only describes "a box (100) which is rectangular, which box preferably but not necessarily is approximately 40 inches in length (L) and 16 inches in width (W) and 10 inches high (H).", See Par. [0012].

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to make the aircraft of Delanne a mini or micro UAV operating in the Reynolds number range of between about 20,000 and 300,000 and between about 10 m/s to about 20 m/s, in view of the teachings of Cox et al. The motivation for doing so would have been to create an aircraft which can be handled in the battlefield (sizing of Cox et al.) yet has high

load carrying capabilities and maneuverability (arrangement of Delanne)."

As discussed above, both Delanne and Cox et al. do not disclose a Mini or Micro UAV according to the claimed combination. Delanne and Cox et al. do not provide a sufficient factual basis to sustain the outstanding rejection. It is noted that at least one of these cited references must definitively disclose a Mini or Micro UAV having the claimed combination of aerodynamic flight parameters to provide the factual basis necessary to support this rejection under 35 USC § 103(a). Thus, clearly Delanne and Cox et al. alone or in combination do not teach or suggest the claimed invention.

In particular, the Examiner comments on page 9, paragraph 27 of the Official Action that the previously submitted arguments are rendered "*moot since it is unclear what structural relationship is being defined by limiting the aircraft to a specific number range.*"

Applicants respectfully submit that amended independent claim 1, and the claims depending therefrom, clearly recite the required structural limitations, and it is respectfully submitted that the Examiner *de facto* concurs that the arguments previously submitted are commensurate with newly amended claims 1 and 30.

As has been previously submitted, the aerodynamic design of such small aircraft as Mini and Micro UAV's, as currently claimed in independent claims 1 and 30, is not a matter of simply scaling down geometrically the design of larger aircraft. This is mainly due to the low Reynolds number in the order of about 2×10^4 to about 3×10^5 in horizontal flight and the concurrent requirement of low speed aerodynamic flight of about 10 to about 20 m/s.

The following reference ("This page is devoted to Reynolds Number and the effects of scaling in the real world" (internet site (2002)):

http://www.angelfire.com/on/dragonflyaircraft/RNumber.html))

clearly makes the point that, in the art, because of the influence of Reynolds numbers on the aerodynamics of an aircraft, a large aircraft size simply cannot be scaled down to a smaller size:

> *"Reynolds number is a very basic principle…If you are thinking "wings are wings" and scale means nothing, then you are* ***thinking wrong****…You cannot expect a full size Cessna 172 wing to fly correctly if you scale it down to a 1/5 scale model of a C-172.* ***The act of changing the wing size will change the way it affects the air it flies thru****…..*
> *…****scaling big things down changes the way they fly. They may still fly, but not the same as the big versions…. Both scale and speed make a very big difference in what shape flies best.****"*

Thus, and as has also been argued previously, scaling down wing dimensions and reducing the flow velocity results in much lower Reynolds numbers, and thus flow conditions, with respect to the original wing.

In the case of independent claims 1 and 30, and the claims depending therefrom, the claimed Mini or Micro UAV is configured for aerodynamic flight at Reynolds numbers and at flight speeds that are considerably reduced with respect to larger conventional aircraft as well as conventional sized UAV.

It is also a well-known phenomenon that lift and drag characteristics deteriorate rapidly as Reynolds number is decreased, so that an acceptable performance in a particular aircraft design generally translates to unacceptable performance when the design is scaled down linearly, and the design Reynolds number or the design speed of the scaled design is also reduced to a fraction of the design Reynolds number or design speed of the original design.

Thus, by definition, attempting to operate a specific full-scale aircraft geometry, that

has been designed for one set of full-scale Reynolds number range and flight speed range, at a much lower Reynolds number range and flight speed range, will be expected by a one of ordinary skill in the art to result in a severe deterioration of performance, even when the geometry of the full-scale aircraft is reduced pro-rata.

In other words, there is no expectation that a particular aircraft configuration at one scale to provide a particular aerodynamic result will also provide the same result if the aircraft design is scaled down, particularly if the operating Reynolds numbers are reduced by several orders of magnitude. Thus, there is no motivation to use a large scale aircraft deign to design a small scale aircraft that will not fly properly.

Thus, it is respectfully submitted that one of ordinary skill in the art recognizes that air vehicle configurations for full scale aircraft, including conventional UAV's, (larger than the aforesaid Mini and Micro UAV's) and which implicitly are configured to operate at much higher Reynolds numbers and flight speeds than claimed in independent claims 1 and 30 do not apply thereto and cannot be simply "scaled down", and would not by itself be scaled down by one of ordinary skill in the art.

Referring specifically to the rejection of claim 1, the Examiner relies on Cox et al. to downsize the arrangement of Delanne.

The Examiner states on page 10, paragraph 28 of the Official Action that there is motivation to scale down for transportability, even at the cost of poorer performance. However, it is arguable whether the Delanne aircraft, if scaled down to the Cox et al. size would be capable of any aerodynamic flight at all.

Furthermore, the aerodynamic flight Reynolds numbers implied by the Cox et al.

reference are far in excess of the Reynolds number range 20,000 to 300,000 or the operating flight speed range 10m/s to about 20m/s set forth in independent claims 1 and 30.

For example, Cox et al. implies an aerodynamic flight Reynolds number range of between 350,000 to 1,000,000, based on a characteristic chord of the main wing which is qualitatively and quantitatively different from the range in independent claims 1 and 30.

Cox et al. also specifies a loiter speed of 55 mph (24.6 M/s) and a stall speed of 50 mph (22.4 M/s), See column 4, lines 53-57, above the speed range claimed in independent claims 1 and 30. Specifically, the UAV of Cox et al. in fact cannot operate at less than 22.4 m/s, which is its stall speed.

Thus, Cox et al. itself *teaches away* from a UAV configured for aerodynamic flight in the Reynolds number range and the speed range of claim 1, and the claims depending therefrom.

It is evident that combining Delanne with Cox et al. will still not result in a Mini or Micro UAV configured for providing aerodynamic flight in the claimed Reynolds number range or the claimed flight speed range, as Cox et al. does not provide the claimed operating ranges and thus cannot cure Delanne's deficiency.

It is also to be noted that Cox et al. simply discloses an aircraft having a smaller overall size than the aircraft of Delanne. The size of Cox et al. is appropriate for that reference, while the size of Delanne is appropriate for Delanne. However, Cox et al. does not teach or in any way suggest *reducing* the size of an aircraft from a large size to a smaller size, and accordingly it is improper to rely on Cox et al. to "reduce" the size of the aircraft in Delanne.

Furthermore, it is respectfully submitted, again, that in any case, if the Delanne aircraft were to be "scaled down" to sizes comparable to the Cox et al. reference, the resulting miniaturized aircraft, by definition, would no longer provide a configuration in which "*the whole of the fuselage is rendered habitable from the front to the rear end*", as the aircraft would now be rendered too small for human habitation and "unmanned", as in Cox et al, in contrast with the intended purpose of Delanne in page 1, left column, lines 22-25. However, it is an accepted principle that if a proposed modification would render the prior art invention being modified (by the secondary reference) unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification (*In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir.1984)).

Even more so, it is respectfully submitted that if the Delanne aircraft were to be downsized even further to a size commensurate with the claimed operating Reynolds number range or the claimed flight speed range in claim 1, the further miniaturized aircraft would suffer severe performance penalties, as has already been discussed above regarding the effect of operating at low Reynolds numbers and low flight speeds, and would be rendered unsuitable for its implicit purpose of providing adequate flight performance. This, again, is contrary to the principle expressed by *In re Gordon* referred to above.

It is further respectfully submitted that, as already discussed above, the invention as presently claimed provides specific combinations of aircraft structural parameters for a Mini or Micro UAV configured for operating at low Reynolds number range or low flight speed range, which are well beyond the domain of full-sized aircraft and larger UAV's.

One of ordinary skill in the art recognizes that when wishing to configure a new aircraft such as a Mini or Micro UAV according to the claimed combination, there is a *very*

large number of prior art parameters from which to choose to provide the aircraft configuration. To name but a few such parameters by way of example: having empennage or being tailless; having canard or no canard; single wing or multiple wings; wing parameters including aspect ratio, span, chord, wing sections; close-coupled fore and aft wings; uncoupled wings; wings having side panels, or no panels; wing booms or no wing booms; wings having tapered, non-tapered, elliptical or other platforms; wings having positive sweep, negative sweep or zero sweep for the leading edge of each wing; wings having positive sweep, negative sweep or zero sweep for the trailing edge of each wing; wings being at same height or at different heights in the fuselage; wing dihedral or anhedral; delta wings; blended body wing configurations; flying wing configurations, lifting body configurations; optimized for subsonic, transonic, supersonic cruise; etc.

However, the prior art cited by the Examiner totally fails to identify *which* parameters are critical for such a Mini or Micro UAV as claimed, or which parameters are likely to be successful for such a Mini or Micro UAV as claimed.

It is respectfully submitted that it is accepted practice (*In re Kubin* (CAFC 2009)) that under circumstances such as above, the claimed combinations are *not obvious* under USC 103.

It is evident from the above that starting with Delanne and merely scaling down the size thereof would be expected to provide a miniaturized aircraft having the identical geometry as the full-scale aircraft, but with severely degraded performance, and thus would be ultimately unsuitable as an operating aircraft. In contrast, the present invention provides a Mini or Micro UAV having significant performance (see for example page 6, line 22 to page 7, line 18 of the specification), and thus represents an unexpected result as compared

with the cited prior art.

Further, one or more of the elements in the air vehicle of claim 1 are being used in a non-established way. In these claims, these one or more elements are used in a Mini or Micro UAV, while in the cited prior art, such elements are only known in use with full-scale aircraft, which as already discussed above are *qualitatively* different from the Mini or Micro-UAV claimed, being configured for operating at completely different Reynolds number and air speed ranges.

Delanne and Cox et al. alone or in combination do not teach or suggest the claim invention.

In view of the above, it is respectfully submitted that the subject claims are novel and inventive over the prior art of record. For at least these reasons it is also respectfully submitted that their dependent claims are also novel and inventive over the prior art of record.

Regarding Claim 7, this claim recites that "*said fore wing and said aft wing partially overlap each other in plan view*".

The Delanne reference does not disclose any overlap between the front and rear wings in plan view, in contrast to claim 7.

The Examiner states in item 29 on page 10 that "*a vertical, line can be drawn in both Figs, 4 and 7 of Delanne which intersects both the fore and aft wing; thus the wings overlap each other...*". However, this does not anticipate claim 7. The aircraft arrangement of claim 7 includes the specific fore and aft wing configurations of claim 1, in which

"*said **aft wing has** side panels and control surfaces on at least one of said aft*

wing and said side panels, and ***tapered planform with positive sweep****, said* ***fore wing has non-positive trailing edge sweep****, the fore wing and aft wing being disposed at different heights*"

Figs. 4 and 7 of Dellane do not refer to the same aircraft as in Fig 1 thereof. In fact, as clearly seen in Fig. 6, this aircraft configuration does not comprise a tapered planform with positive sweep for the aft wing, or a fore wing with non-positive trailing edge sweep, in contrast with claim 7. On the other hand, Fig. 1 of Delanne does not show any overlap in plan view for that specific configuration.

Regarding Claim 8, this claim recites that the "*tandem arrangement of said fore wing and said aft wing has an overall width W and an overall length L including any control surfaces of said UAV, and* the sum of planform wing areas *of said tandem arrangement is at least 70% of the product W x L*".

The Examiner states in paragraph 29 on page 10 that "thus the wings overlap each other and comprise 100% of WxL.", apparently this resulting from the overlap of the wings illustrated in Figs. 4 and 7 of Delanne. However, this is not understandable.

In the first place, Figs. 4 and 7 show only a cross-section at a particular point along the wing span. The vertical overlap of Fig 4 is partial, and says nothing about whether there is any overlap, or of the extent of any overlap, at other stations along the span of the wings. Fig. 7 only shows one wing cross-section. Thus it is impossible to provide any information about overlap in plan view from the cross-sectional views of Figs. 4 and 7.

It has also been argued previously that if a rectangle is drawn over the plan view of Fig. 2 of Delanne, so that a first pair of opposed sides of the rectangle are aligned with the

leading edge of the fore wing and the aft edge of the aft wing of Delanne, and a second pair of opposed sides of the rectangle are in abutment with the wing tips of the fore wing, the rectangle represents the product "WxL" of claim 8. It is evident that the sum of the wing areas of the front and rear wings in Delanne is much less than 70% of the area of this rectangle, in contrast with claims 8 and 32. Similarly, if a rectangle is drawn over the plan view of the Libellula reference, so that a first pair of opposed sides of the rectangle are aligned with the leading edge of the fore wing and the trailing edge at the wing tip of the aft wing of the Libellula reference, and a second pair of opposed sides of the rectangle are in abutment with the wing tips of the aft wing, the rectangle represents the product "WxL" of claims 8. It is also evident that the sum of the wing areas of the front and rear wings in the Libellula reference is much less than 70% of the area of this rectangle, in contrast with claims 8.

III. Claims 21, 22, 25, and 26 stand rejected under 35 USC § 103(a) as being unpatentable over Delanne (U.S. Patent No. 2,147,968) and Cox et al. (U. .S. Patent Application Publication No. 2003/0155463) as applied to claim 1 above, and further in view of Cox et al (U.S. Patent No. 6,626,398) beginning at Paragraph 18 on page 6 of the Official Action. This rejection is respectfully traversed.

Again, Delanne discloses a manned full size aircraft and Cox et al. (U.S. Patent Application Publication No. 2003/0155463) discloses an unmanned aircraft, as discussed above in the rejection of claims 1-4, 6-20, 36, and 37 under 35 USC § 103(a) as being unpatentable over Delanne in view of Cox et al.

Cox et al. (U.S. 6,626,398) discloses a UAV system 10 having a wingspan of 80 to 120 inches, See Table 1, column 3. This size UAV, Reynolds number range for

aerodynamic flight, flight velocity, and other parameter indicate that the UAV system 10 is not a Mini or Micro UAV.

The Examiner states that "it would have been obvious to one of ordinary skill in the art to apply dihedral, diverging fore and aft wings, and positive angle of incidence to the UAV of Delanne and Cox et al. described above and further in view of the teaching of Cox '398."

Delanne, Cox et al. (U.S. Patent Application Publication No. 2003/0155463), and Cox et al. (US 6,626,398) do not factually disclose a Mini or Micro UAV according to the claimed combination . These cited references do not provide the factual basis to support the rejection of Claims 21, 22, 25, and 26 under 35 USC § 103(a). Cox et al. adds no relevant disclosure to Delanne and Cox et al. to teach or suggest the claim Mini or Micro UAV. Thus, Delanne, Cox et al., and Cox et al. (US 6,626,398) alone or in combination do not teach or suggest the claimed invention.

IV. Claims 5, 23, 24, and 27-29 stand rejected under 35 USC § 103(a) as being unpatentable over Delanne (U.S. Patent No. 2,147,968), Cox et al. (U. .S. Patent Application Publication No. 2003/0155463), and Cox et al (U.S. Patent No. 6,626,398) as applied to claims 1 and 4 above, and further in view of Fraser (US Patent 3,954,231) beginning at Paragraph 19 on page 6 of the Official Action. This rejection is respectfully traversed.

Again, Delanne discloses a manned full size aircraft and Cox et al. (U.S. Patent Application Publication No. 2003/0155463) discloses an unmanned aircraft, as discussed above in the rejection of claims 1-4, 6-20, 36, and 37 under 35 USC § 103(a) as being unpatentable over Delanne in view of Cox et al.

Again, Cox et al. (U.S. 6,626,398) discloses a UAV system 10 having a wingspan of

80 to 120 inches, See Table 1, column 3. This size UAV, Reynolds number range for aerodynamic flight, flight velocity, and other parameters indicate that the UAV system 10 is not a Mini or Micro UAV.

Fraser is cited by the Examiner as disclosing a tandem wing aircraft configuration wherein the fore wing is mounted on the upper side of the fuselage on at least one pylon (Fig. 4); and the fore wing and aft wing have twist (Fig. 11). Fraser is also cited as disclosing a fighter type aircraft (Fig. 6); and a pusher type propeller (Fig. 10).

The Examiner states that "it would have been obvious to one of ordinary skill in the art to provide the aircraft arrangement of Delanne, Cox et al., and Cox '398 as described above with the pylon, wing twist, and stability characteristic of Fraser. The motivation for doing so would have been to meet the flight requirements with respect to maneuverability and range for the UAV."

Delanne, Cox et al. (U.S. Patent Application Publication No. 2003/0155463), Cox et al. (US 6,626,398), and Fraser do not factually disclose a Mini or Micro UAV according to the claimed combination. These cited references do not provide the factual basis to support the rejection of claims under 35 U.S.C. § 103(a). Fraser adds no relevant disclosure to Delanne, Cox et al., and Cox et al. to teach or suggest the claimed Mini or Micro UAV. Thus, Delanne, Cox et al., Cox et al., and Fraser alone or in combination do not teach or suggest the claimed invention.

V. Claims 30-32, and 34 stand rejected under 35 USC § 103(a) as being unpatentable over Miles Aircraft Libellula M.35 in view of Cox et al. (U.S. Patent Application Publication No. 2003/0155463) beginning at Paragraph 20 on page 7 of the Official Action. This rejection is respectfully traversed.

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to place the aircraft arrangement of the Libellula M.35 design on a mini or Micro UAV in view of the teaching of Cox et al. The motivation for doing so would have been to provide a lightweight stable reconnaissance vehicle that is easily transportable on the battlefield."

Contrary to the Examiner's position, the Libellula reference does not disclose any aircraft configured for aerodynamic flight at the Reynolds number range of 20,000 to 300,000, less so at flight speeds of 10m/s to 20m/s.

Furthermore, the Libellula reference does not disclose or suggest any "close coupling" between the front wings and the rear wings.

The Examiner states at paragraph 30, page 10 of the Official Action that the arrangement of Libellula "*is considered to be close coupled because they are too near to one another to be placed at the same height.*" In the first place, there is no such disclosure or suggestion in this reference. Moreover, there are plenty of examples of aircraft in which the main wings and the canards or tailplanes are at different heights, and yet are not close coupled. Thus, having the front and rear sets of wings at different heights does not, of itself, disclose or suggest close coupling per se.

In the second place, page 9, lines 3, 4 of the specification defines close coupling as: "*where the average gap between the trailing edge of the fore wing and the leading edge of the aft wing is less than the fore wing root chord*". In the Libellula reference, the canards and rear wings are separated by an average spacing that is significantly larger than the forward wing root chord at the fuselage. As may be clearly seen in the plan view of the aircraft in this reference, this spacing is at a minimum at the root, where the spacing is about the same size as the root chord of the canard, and this spacing increases rapidly in

the direction towards the wing tips, so that the average gap is clearly larger than the canard root chord, in contrast with the close-coupling arrangement of claim 30.

Furthermore, the Libellula reference refers to a full size manned fighter aircraft, configured for operating at Reynolds numbers and airspeeds well in excess of the range claimed in claim 30.

It is further submitted that the arguments provided above regarding the combination of Delanne with the first Cox reference apply, *mutatis mutandis*, to the combination of the Libellula reference and the second Cox reference.

Miles and Cox et al. alone or in combination doe not teach or suggest the claimed invention.

In view of the above, it is respectfully submitted that independent claim 30 is novel and inventive over the prior art of record. For at least these reasons it is also respectfully submitted that dependent claims are also novel and inventive over the prior art of record.

Regarding claim 32, this claim recites that the "*tandem arrangement of said fore wing and said aft wing has an overall width W and an overall length L including any control surfaces of said UAV, and the* sum of planform wing areas *of said tandem arrangement is at least 70% of the product W x L*".

The Examiner states in paragraph 29 on page 10 that "thus the wings overlap each other and comprise 100% of WxL.", apparently this resulting from the overlap of the wings illustrated in Figs. 4 and 7 of Delanne. However, this is not understandable.

In the first place, Figs. 4 and 7 show only a cross-section at a particular point along the wing span. The vertical overlap of Fig 4 is partial, and says nothing about whether there

is any overlap, or of the extent of any overlap, at other stations along the span of the wings. Fig. 7 only shows one wing cross-section. Thus it is impossible to provide any information about overlap in plan view from the cross-sectional views of Figs. 4 and 7.

It has also been argued previously that if a rectangle is drawn over the plan view of Fig. 2 of Delanne, so that a first pair of opposed sides of the rectangle are aligned with the leading edge of the fore wing and the aft edge of the aft wing of Delanne, and a second pair of opposed sides of the rectangle are in abutment with the wing tips of the fore wing, the rectangle represents the product "WxL" of claim 32. It is evident that the sum of the wing areas of the front and rear wings in Delanne is much less than 70% of the area of this rectangle, in contrast with claim 32. Similarly, if a rectangle is drawn over the plan view of the Libellula reference, so that a first pair of opposed sides of the rectangle are aligned with the leading edge of the fore wing and the trailing edge at the wing tip of the aft wing of the Libellula reference, and a second pair of opposed sides of the rectangle are in abutment with the wing tips of the aft wing, the rectangle represents the product "WxL" of claim 32. It is also evident that the sum of the wing areas of the front and rear wings in the Libellula reference is much less than 70% of the area of this rectangle, in contrast with claim 32.

VI. Claim 33 stands rejected under 35 USC § 103(a) as being unpatentable over Miles Aircraft Libellula M.35 in view of Cox et al. (U.S. Patent Application Publication No. 2003/0155463) as applied to claim 30 above, and further in view of Warsop et al. (US 6,607,162) beginning at Paragraph 24 on page 8 of the Official Action. This rejection is respectfully traversed.

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to make the aircraft of Libellula M.35 and Cox et al. with a longitudinal length and a maximum wingspan not greater than about 15 cm in view of the teaching of Warsop et al.

The motivation for doing so would have been to make the aircraft small and light; suitable for short efficient missions."

The specific dimensions for the micro UAV claimed is neither disclosed nor rendered obvious by the prior art of record. Miles and Cox et al. alone or in combination do not teach or suggest the claimed invention.

VII. Claim 35 stands rejected under 35 USC § 103(a) as being unpatentable over Delanne in view of Cox et al. as applied to claim 1 above, and further in view of Warsop et al. (US 6,607,162) beginning at Paragraph 25 on page 9 of the Official Action. This rejection is respectfully traversed.

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to make the aircraft of Delanne and Cox et al. with a longitudinal length and a maximum wingspan not greater than about 15 cm in view of the teaching of Warsop et al. The motivation for doing so would have been to make the aircraft small and light; suitable for short efficient missions."

The specific dimensions for the micro UAV claimed is neither disclosed nor rendered obvious by the prior art of record. Miles and Cox et al. alone or in combination do not teach or suggest the claimed invention.

CONCLUSION

Applicants assert that the claims are in condition for immediate allowance and early notice to that effect is earnestly solicited. Should the Examiner deem that any further action by Applicants' undersigned representative is desirable and/or necessary, the Examiner is invited to telephone the undersigned at the number set forth below.

In the event this paper is not timely filed, Applicants hereby petition for an appropriate extension of time. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 14-0112.

Respectfully submitted,

THE NATH LAW GROUP

/Susanne M. Hopkins/

Susanne M. Hopkins
Registration No. 33,247
William L. Klima
Registration No. 32,422
Jiaxiao Zhang
Registration No. 63,235
Customer No. 20529

December 20, 2010

THE NATH LAW GROUP
112 South West Street
Alexandria, VA 22314-2891
Tel: (703) 548-6284
Fax: (703) 683-8396